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EXAMINER	
LAVARIAS, ARNEL C	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 03/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/776,256	CEMIC ET AL.
	Examiner	Art Unit
	Arnel C. Lavarias	2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/17/04,12/15/04*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3,4 and 7-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3,4 and 7-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendments to the abstract of the disclosure in the submission dated 12/17/04 are acknowledged and accepted. In view of these amendments, the objections to the specification in Section 6 of the Office Action dated 7/26/04 are respectfully withdrawn.

2. The amendments to Claims 3-4, 7-8 in the submission dated 12/17/04 are acknowledged and accepted. In view of these amendments, the objections to the claims in Section 7 of the Office Action dated 7/26/04 are respectfully withdrawn.

3. The addition of Claims 9-10 in the submission dated 12/17/04 is acknowledged and accepted.

Response to Arguments

4. The Applicants' arguments with respect to Claims 3-4, 7-8 have been considered but are moot in view of the new ground(s) of rejection.

5. Claims 3-4, 7-10 are now rejected as follows.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 7-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 7 and 8 both recite the limitation that a detector device determines the values of X and Y coordinates of a feature within the X-Y displaceable measurement stage. After reviewing the specification and drawings of the disclosure, it appears that such a limitation is neither supported nor disclosed. On Page 14, lines 7-15, the specification only discloses that a position of a feature is determined as coordinates on a mask by way of the detector device. Claims 9-10 are dependent on Claims 7-8 and hence inherit the deficiencies of Claims 7-8.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji (U.S. Patent No. 6285855), of record in view of Shibata et al. (JP06029189A).

Tsuji discloses an illumination device (See for example Figures 3A, 3B, 6) having a light source (See 1 in Figure 6); a coupling-in optical system which couples the light of

the light source into a first location of the optical system (See for example 91, 92, 2 in Figure 6), wherein the coupling-in optical system having a large numerical entrance aperture (See col. 7, line 49-col. 8, line 48; It is noted that the numerical aperture is defined as the product of half angle acceptance cone of the optical element and the refractive index of the medium in which the acceptance cone is in. Thus, in the instant case, the numerical aperture is $NA = n \cdot \sin(\theta) = \sin(\frac{\varepsilon b}{2})$ for Figure 3B, for example.); a coupling-out optical system which couples out the light emerging from a second location of the optical system (See for example 3 in Figure 6); an illumination optical system (See 93 in Figure 6) which illuminates an imaging field (See 94 in Figure 6); and a homogenizing optical system which is arranged between the coupling-out optical system and the illuminating optical system (See for example 4, 5, 7, 8 in Figure 6), wherein the homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the second location of the optical system (See col. 5, lines 29-43), and wherein homogenization occurs in an intermediate image plane that is outside of an object, and is performed only by the homogenizing optical system (See for example col. 5, line 15-col. 6, line 35). Tsuji lacks an optical fiber bundle placed between the coupling-in optical system and the coupling-out system. However, the use of optical fibers and optical fiber bundles to flexibly route light to any particular location is well known in the art. For example, Shibata et al. teaches a conventional projection type illumination device (See for example Figures 1, 3-4, 8-9, 11), wherein an optical fiber bundle (See for example 1 in Figure 9) is utilized near the light source (See for example 24, 25 in Figure 9) and between optical elements to couple light into and out of

the fiber bundle (See for example 510, 516 in Figure 9). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have an optical fiber bundle be placed between the coupling-in optical system and the coupling-out system, as taught by Shibata et al., in the illumination device of Tsuji, for the purpose of providing flexible placement of the light source independent of the location of the rest of the optical system, as well as remote delivery of the light emitted from the source, particularly in instances where the light source is too large to fit in the optical system.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji in view of Shibata et al. as applied to Claim 3 above, and further in view of Pedrotti et al. (F. L. Pedrotti, L. S. Pedrotti, 'Introduction to Optics', Prentice Hall, New Jersey, 1993, pp. 135-139.), of record.

Tsuji in view of Shibata et al. discloses the invention as set forth above in Claim 3, except for the numerical entrance aperture being greater than 0.60. However, Tsuji further addresses increasing the emission angle ε from a smaller value εa to a larger value εb, thus increasing the numerical aperture (See col. 7, line 49-col. 8, line 48). Further, it is well known in the art to utilize lenses or groups of lenses to obtain a high numerical aperture. For example, Pedrotti et al. teaches that typical numerical apertures for lens groups such as microscope objectives may range from 0.08-1.3, with 0.05, 0.1, 0.2, 0.4, 0.6, and 0.8 being extremely common for non-immersed lenses. Pedrotti et al. further teaches that high numerical aperture lenses impart particular advantages to the optical system, including higher image brightness, greater resolving power, and shorter working

distance. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the numerical entrance aperture of the coupling-in optical system be greater than 0.60, as taught by Pedrotti et al., in the illumination device of Tsuji in view of Shibata et al., for the purpose of increasing image brightness and resolving power of the illumination device.

11. Claims 7, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent No. 6456377 or Suzuki '377), of record, in view of Suzuki (U.S. Patent No. 5608575 or Suzuki '575), of record, Tsuji, and Matsumoto et al. (U.S. Patent No. 6064477).

Suzuki '377 discloses an exposure system, which incorporates a coordinate measuring instrument including a horizontally X-Y displaceable measurement stage (See 50 in Figure 1) for receiving a substrate (See W in Figure 1; or 62 in Figure 2) with a feature, such as an edge (See 64 in Figures 2-3; col. 14, line 58-col. 15, line 28), that is to be measured; an illumination system (See for example Figures 1-2); and a detector device for determining the position of the feature (See 100 in Figure 1; 70 in Figure 2); and the illumination system having a light source (See 12, 14 in Figure 1), an illuminating optical system (See 40a, 40b, PL in Figure 1) for illuminating an imaging field, and a homogenizing optical system which is arranged between the light source and the illuminating optical system (See 16 in Figure 1), wherein the homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the light source (See col. 9, line 66-col. 10, line 47; col. 14, lines 27-50). Suzuki '377 lacks an optical fiber bundle; a coupling-in optical system having a large

numerical entrance aperture and which couples the light of the light source into a first end of the fiber bundle; a coupling-out optical system which couples out the light emerging from a second end of the fiber bundle; and the detector determining values of X and Y coordinates of the feature within the X-Y displaceable measurement stage. However, Suzuki '575 teaches a similar exposure system, including an illumination device (See Figure 4), the device having a horizontally X-Y displaceable measurement stage (See 45 in Figure 4) for receiving a substrate with a feature that is to be measured (See 43 in Figure 4); an illumination system; and a detector device (See 47, 48 in Figure 4); and the illumination device having a light source (See 11, 12 in Figure 4); an optical waveguide (See 15 in Figure 4); a coupling-in optical system having a numerical entrance aperture (It is noted that although this feature is not specifically shown in Figure 4, this feature is inherent to the coupling-in optical system such that light may pass into the coupling-in optical system) and which couples the light of the light source into a first end of the waveguide (See 12, 13, 14 in Figure 4); a coupling-out optical system which couples out the light emerging form a second end of the optical waveguide (See 16a, 16b, 17, 18 in Figure 4); and an illumination optical system (See 28, 42 in Figure 4) which receives the light emerging from the coupling-out optical system and illuminates an imaging field (See 41, 46a, 46b, 43 in Figure 4); the illumination device further comprising an optical fiber bundle which is arranged as the optical waveguide (See 15 in Figure 4; col. 10, lines 35-58); and a homogenizing optical system which is arranged between the coupling-out optical system and the illuminating optical system (See 19 in Figure 4), wherein the homogenizing optical system homogenizes the nonuniform intensity distribution in the

image field of the light emerging from the optical fiber bundle (See col. 10, line 59-col. 11, line 35). The combined teachings of Suzuki '377 and Suzuki '575 lack the numerical entrance aperture of the coupling-in optical system being large, or the detector determining values of X and Y coordinates of the feature within the X-Y displaceable measurement stage. However, Tsuji teaches an illumination device (See for example Figures 3A, 3B, 6) having a light source (See 1 in Figure 6); an optical waveguide (See 4 in Figure 6); a coupling-in optical system which couples the light of the light source into a first end of the waveguide (See 91, 92, 2, 3 in Figure 6); a coupling-out optical system which couples out the light emerging from a second end of the optical waveguide (See 5 in Figure 6); and an illumination optical system (See 93 in Figure 6) which receives the light emerging from the coupling-out optical system and illuminates an imaging field (See 94 in Figure 6), the illumination device further comprising an optical fiber bundle which is arranged as the optical waveguide (See 4 in Figure 6; col. 4, line 43-col. 5, line 28); and a homogenizing optical system which is arranged between the coupling-out optical system and the illuminating optical system (See 7 in Figure 6), wherein the homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle (See col. 5, lines 29-43), wherein the light of the light source is picked off via the coupling-in optical system (See 2a, 2b, 3, 4 in Figures 3A and 3B; 1, 91, 92, 2, 3, 4 in Figure 6) having a large numerical entrance aperture (See col. 7, line 49-col. 8, line 48) and is coupled into the optical fiber bundle. It is noted that the numerical aperture is defined as the product of half angle acceptance cone of the optical element and the refractive index of the medium in which

the acceptance cone is in. Thus, in the instant case, the numerical aperture is $NA = n \cdot \sin(\theta) = \sin(\frac{\varepsilon b}{2})$ for Figure 3B, for example. Finally, the combined teachings of Suzuki '377, Suzuki '575, and Tsuji lack the detector determining values of X and Y coordinates of the feature within the X-Y displaceable measurement stage. However, it is well known in the art to have detection systems utilized for coordinate or positional measurements to attribute values for position (e.g. X and Y values or r and θ values for two-dimensional coordinates). For example Matsumoto et al. teaches an inspection apparatus utilizing illuminating sources and detection systems (See for example Figures 1, 16-17, 34-35, 40-41), wherein the detection system, in conjunction with data from the translation stage, provides coordinate or positional information of particular features on a surface (See for example col. 20, line 43-col. 21, line 12) to the operator. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the device of Suzuki '377 further include an optical fiber bundle; a coupling-in optical system having a large numerical entrance aperture and which couples the light of the light source into a first end of the waveguide; a coupling-out optical system which couples out the light emerging from a second end of the optical waveguide; and the detector determining values of X and Y coordinates of the feature within the X-Y displaceable measurement stage, as taught by Suzuki '575, Tsuji, and Matsumoto et al., for the purpose of 1) diffusing the light emitted from the light source, while allowing ease in alignment in routing the light within the optical system, 2) maximizing light throughput through the optical system, and 3) providing additional information which may be utilized for further processing, data analysis or optical system optimization.

12. Claim 8, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki '377 in view of Suzuki '577, Tsuji, and Matsumoto et al. as applied to Claims 7, 10 above, and further in view of Pedrotti et al.

Suzuki '377 in view of Suzuki '575, Tsuji, and Matsumoto et al. discloses the invention as set forth above in Claims 7, 10, except for the numerical entrance aperture being greater than 0.60. However, Tsuji further addresses increasing the emission angle ε from a smaller value εa to a larger value εb, thus increasing the numerical aperture (See col. 7, line 49-col. 8, line 48 of Tsuji). Further, it is well known in the art to utilize lenses or groups of lenses to obtain a high numerical aperture. For example, Pedrotti et al. teaches that typical numerical apertures for lens groups such as microscope objectives may range from 0.08-1.3, with 0.05, 0.1, 0.2, 0.4, 0.6, and 0.8 being extremely common for non-immersed lenses. Pedrotti et al. further teaches that high numerical aperture lenses impart particular advantages to the optical system, including higher image brightness, greater resolving power, and shorter working distance. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the numerical entrance aperture of the coupling-in optical system be greater than 0.60, as taught by Pedrotti et al., in the coordinate measuring instrument of Suzuki '377 in view of Suzuki '575, Tsuji, and Matsumoto et al., for the purpose of increasing image brightness and resolving power of the optical device.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arnel C. Lavarias
3/13/05

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